

## CHAPTER 2. NATURAL SETTING

### Physiography and Regional Geology

The study area is located within the Dan River Triassic Basin of the Piedmont Physiographic Province (Espenshade et al. 1975). The Triassic Basin formed along zones of faulting and subsidence during the crustal stretching that occurred with the breakup of the supercontinent Pangea. Bedrock in the vicinity of the subject site is the Stoneville Formation (Figure 3), which consists primarily of red and brown sandstones and mudstones (Olsen et al. 1991). Along the northwestern border of the Dan River Basin are "poorly sorted, coarse-grained conglomerate and arkosic sandstones," and the mineralogy of these sedimentary rocks is similar to that of the metamorphic rocks northwest of the basin (Olsen et al. 1991).

The Dan River Triassic Basin is about 5 km wide in this area and is bounded on the northwest by the Sauratown Mountains anticlinorium and on the southeast by the Charlotte Geologic Belt. The Dan River flows south-southeast across bedrock of the Hogan Creek Formation (within the Sauratown Mountains anticlinorium), over the Chatham Fault Zone into the Dan River Triassic Basin (see Figure 3). The Hogan Creek Formation is composed of schist and gneiss with some amphibolite, marble, quartzite, and metamorphosed ultramafic rock (chlorite-anthophyllite-talc rock) (Horton and McConnell 1991). This mineralogy is reflected in the sedimentary bedrock within the basin (Olsen et al. 1991) and should also influence the floodplain sediment in the vicinity of the subject site.

### Soils

Soils in the study area are mapped in the soil survey of Stokes County as Riverview and Toccoa soils (Leab 1995). These soils occur in floodplains along the Dan River and Town Fork Creek in the southeastern part of the county. The Toccoa soils formed along the stream channel in recent alluvium and are well drained to moderately well drained. The surface horizon (Ap) is 6 to 12 inches thick and consists of a fine sandy loam. Directly below the surface horizon is the C-horizon that is commonly a fine sandy loam to sandy loam and extends to a depth of 40 inches. Below 40 inches the texture varies from sand to sandy loam, and stratification and gravelly layers can be present. Slopes range from 0 to 4 percent.

Riverview soils occur away from the stream channel and are well drained to moderately well drained. The Ap horizon is a loam that extends to a depth of 8 inches. The Bw horizon varies in texture from a sandy loam to a clay loam and extends to a depth of 46 inches. Mottles are common below a depth of 24 inches. Buried A- and B-horizons occur in this soil type and are similar in texture and color to the modern A- and B-horizons. Stratification can be present in the C-horizon that has textures ranging from sand to clay. Slopes range from 0 to 4 percent.

The study area includes a lateral ditch excavated into the floodplain of the Dan River north of where NC 311 crosses the floodplain. The lateral ditch was probably excavated in Riverview soils in the center of the floodplain and extended into the Toccoa soils closer to the stream channel. The Toccoa soils are sandier than the Riverview soils because they occur along the river channel. This increase in sand was noted in the east end of the lateral ditch near the Dan River. Also, the buried A- and B-horizons found in the Riverview soils within the floodplain appeared to pinch out to the east toward the river and the Toccoa soils.

## Hydrology

In the study area, the Dan River flows along the northeast side of a 650-m-wide floodplain. A linear depression occurs within the floodplain approximately 400 m southwest of the modern channel. This depression probably represents a former position of the river channel. The gradient of the Dan River in this area is 2 feet/mile.

The linear nature of the floodplain as the Dan River crosses the Triassic basin from northwest to southeast indicates that the river could be following a structural feature in the bedrock (see Figure 3).

The Dan River has played an integral part in the prehistory and history of Stokes County. Flooding and soil deposition patterns have therefore affected and continue to affect the ways in which the people of the county prosper.

By 1860, deforestation was a severe problem in Stokes County due to the iron industry's demand for charcoal (Custom House 1977). In addition, commercial cutting affected the remaining forests. In 1912, it was estimated that the original forest cover of Stokes County had been greatly changed by the continuous cutting of marketable species (Pratt 1912). At that time the old forest pines had largely been cut out, leaving oak as the most abundant forest species.

A major concern arising from the deforestation was the potential for major flooding due to the decreased capacity of the deforested land to absorb water. The danger became especially acute as fires, either accidental or deliberate, which followed the logging operations destroyed the understory vegetation as well as the topsoil (Schwarzkopf 1985:88).

Not far to the west of the project area on the Yadkin and French Broad rivers, a catastrophic flood took place early in July 1916. One tropical storm followed by another dumped a United States-record amount of 22.22 inches of rain in Altopass. Bridges were swept away, and industrial plants and agricultural crops were extensively damaged. Mud slides swept away railroad lines. All of the rivers on the west side of the Blue Ridge were in flood stage (Southern Railway 1917).

The Yadkin River flooded 18 inches higher in August 1940, covering the fertile bottomlands with a heavy load of sand and rendering many of them useless (Rutledge and Welborn 1965). Flooding continues on the Yadkin River such that farmers must use heavy equipment to remove loads of silt from the bottomlands.

Hurricane Agnes struck in June 1972. Its heavy rains brought extensive flooding to the Piedmont, with the most extensive damage on the Yadkin-Pee Dee River system and on the Dan River. Record rainfalls of more than 10 inches were recorded. It was one of the most expensive storms in history, with damages in North Carolina alone estimated at \$4.28 million (Barnes 1995).

The southern Piedmont is one of the most severely eroded areas in the United States. Trimble (1974) has estimated that the North Carolina Piedmont, as a whole, has lost at least 5.5 inches of soil since it was settled by Europeans. The Stokes County area has lost an estimated 4.5 to 7 inches of soil due to erosion.

Trimble (1974) has divided the southern Piedmont into regions based on their Erosive Land Use (ELU) practices. He has placed Stokes County in Region VA, the Mixed Farming Area region with generally low erosive land use, except in the period after the Civil War when increased tobacco cultivation and increases in abandoned land greatly increased the ELU.

## **Vegetation**

The project area is located in the western portion of the Oak-Pine Forest Region (Braun 1950), which in the Carolinas is more or less coextensive with the Piedmont. Oaks and hickories are the most common and widespread species. Except on poorer soils and in drier spots, the pines are usually temporary and are ultimately replaced by deciduous species.

Forested areas of the Riverview and Toccoa soils are inhabited by American sycamore, sweetgum, eastern cottonwood, yellow poplar, Loblolly pine, and green ash. Understory growth includes poison ivy, honeysuckle, river birch, and switchcane (Leab 1995).

## **Climate**

The summers are long and hot in Stokes County due to the moist tropical air from the Gulf of Mexico that covers the area. The average yearly precipitation is about 45 inches. The average winter temperature is 37 degrees F, while the average summer temperature is 74 degrees F (Leab 1995).